

# PATENT SPECIFICATION

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314,797

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## COMPLETE SPECIFICATION.

### Luffing Crane.

I, FRIEDRICH AUGUST ALBERT ESSMANN, of German Nationality, of 5, Polostrasse, Altona-Nienstedten, Germany, formerly of Lindenallee Altona-Othmarschen, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

10 There are already known luffing jib cranes in which the luffing of the jib is effected after each load-hoisting operation. In the luffing operation the hoisted load describes a rectilinear, inclined or  
15 horizontal path. Luffing cranes have, in consequence of the possibility of varying the radius of swing of the jib or of the load at will during operation, the further advantage that in an installation of cranes  
20 the several cranes can be spaced more closely together, so that, for example, a ship can be served by several cranes simultaneously.

In one known construction of luffing  
25 crane the jib is carried by two pivoted links which constitute a link parallelogram. On luffing the jib, the latter is moved parallel to itself along an upwardly directed curve, that is, is bodily raised  
30 or lowered. In another known construction in which the jib is carried by two links which form an irregular quadrangular linkage, the rear or lower end of the jib is raised or lowered.

35 The object of the present invention is to overcome drawbacks experienced with known constructions.

According to the invention the polygonal link system which carries the jib  
40 directly is guided or carried at the lower ends of the links by another link system jointed thereto.

A preferred construction in which the jib moves in a practically horizontal path  
45 includes an upper and a lower pair of rocking supports, each pair forming a link parallelogram.

The lower pair of rocking supports or links can be replaced by any other  
50 arrangement giving the same movement as that of the free ends of a pair of rocking links.

The invention further includes the  
{Price 1/-}

feature that the actuation of the jib in  
luffing in or out is effected through the  
medium of an extension of one of the sup-  
ports of the upper or lower pair of rocking  
supports or of a part moving in the same  
way as such support.

The invention is illustrated by way of  
example in the accompanying skeleton  
diagrams.

In the construction shown in Figs. 1  
and 2 the pair of links *b, b*, carrying  
65 pivotally the horizontally disposed jib *a*  
and connected by a stay *c* to constitute a  
link parallelogram are guided at their  
lower ends in an arcuate path by aid of  
a pair of links *d, d*. Fig. 1 shows the  
70 jib *a* in extended position; Fig. 2 shows  
the jib in its inner position. The links *b*  
are of the same length as the links *d*.  
During the movement of the jib from the  
Fig. 1 to the Fig. 2 position the jib moves  
75 parallel to itself.

The actuation of the jib *a* is effected  
through the medium of a downwardly  
extending rigid extension *f* of one link  
of the upper pair of links *b*. The free  
80 end of the extension *f* may be connected  
to a crank *g* having a fixed axis of rota-  
tion, so that the jib can be conveniently  
moved. The axis of rotation of the crank  
*g* is preferably located in the straight line  
85 which joins the two supporting joints of  
the links *d*.

Instead of being unitary with one of the  
links *b* the extension may be unitary with  
a stay parallel to the links and disposed  
90 between them, as shown in Fig. 8.

Also, the axis of rotation of the crank *g*  
may coincide with the pivotal centre of  
one of the links *d* (Fig. 8).

If the links *b, b* and *d, d* and the exten-  
95 sion *f* are all of the same length, and the  
links form link parallelograms, and if the  
axis *o* of the crank *g* lies in the straight  
line containing the points of attachment *p*  
of the links *d*, and if the pivotal connec-  
100 tion *n* between the extension and the  
crank lies in the straight line including  
the joints *r, s* at the ends of the rear upper  
link *b*, the jib will move practically hori-  
zontally when luffing (Figs. 1 and 2 and  
105 Figs. 5 and 6).

If while retaining the link parallelo-

gram structure the upper links  $b$ ,  $b$  are longer than the lower link  $d$ ,  $d$ , as shown in Figs. 3 and 4, the free end of the extension moves in a curved path other than a circular arc, while the jib moves horizontally. The actuation of the jib may be effected by means of a cam slot  $h$  formed in accordance with this curve in a fixed part of the crane and co-operating with a follower pin  $l$  fixed to the end of the extension and penetrating a radial slot  $k$  in a driving wheel  $i$  as well as engaging the cam slot. The cam slot  $h$  may be so formed that the movement of the jib  $a$  is effected in an inclined or horizontal exactly rectilinear path. In the luffing crane according to Figs. 3 and 4 the jib moves rectilinearly in a horizontal path. Fig. 3 shows the jib extended, while Fig. 4 shows the jib in its innermost position.

In Figs. 5, 6 and 7 there is shown a luffing crane in which the jib  $a$  is not disposed horizontally but is inclined upwardly. The arrangement of the lower pair of links  $d$  is in this case the same as in the first described crane. As the upper links  $b$  are of the same length as the lower links  $d$ , the jib  $a$  can be actuated by a crank  $g$ . The jib  $a$  is shown in extended position in Fig. 6, in mid-position in Fig. 6 and in its innermost position in Fig. 7. A similar crane is shown in Fig. 8 with the jib in its innermost position. In Fig. 8 the extension  $f$  is not constituted by a prolongation of one of the links  $d$  but is formed as a prolongation of a stay  $m$  disposed parallel to the upper links  $b$  and connected to move therewith. In this form the axis of rotation of the crank  $g$  coincides with the axis of rocking movement of one of the lower link  $d$ .

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

(1) A luffing crane having a jib carried by swinging supports forming a link

parallelogram characterised in that the said link parallelogram is jointed to a second link parallelogram mounted to rock on the crane structure.

(2) A luffing crane according to claim 1 further characterised in that one of the links  $b$  of the first link parallelogram, or a stay  $m$  moving similarly, is provided with an extension  $f$  constituting a jib-actuating or guiding arm for moving the two sets of links or rocking supports.

(3) A luffing crane according to claim 2 further characterised in that the extension  $f$  is connected to a crank  $g$ .

(4) A luffing crane according to claim 3 further characterised in that the axis of rotation of the crank coincides with the fixed axis of one of the links or rocking supports of the second link parallelogram.

(5) A luffing crane according to claims 1 and 3 further characterised in that the links  $b$ ,  $b$  and  $d$ ,  $d$  of the two link parallelograms are of the same length as the extension  $f$  and that the axis of rotation of the crank  $g$  is located in the line joining the fixed pivots  $p$  of the links  $d$ ,  $d$  of the second link parallelogram.

(6) A luffing crane according to claims 2 and 5 further characterised in that means serving to guide the end of the extension is also contrived to serve as actuating means.

(7) A luffing crane according to claim 2 further characterised in that the extension  $f$  is so guided by a stationary cam or other suitable guiding device that the jib moves in a rectilinear horizontal or inclined path.

(8) A luffing crane according to claim 1 further characterised in that the links of the first link parallelogram are longer than the links or rocking supports of the second link parallelogram.

Dated this 10th day of June, 1929.  
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Agents for the Applicant.

*Fig. 1*

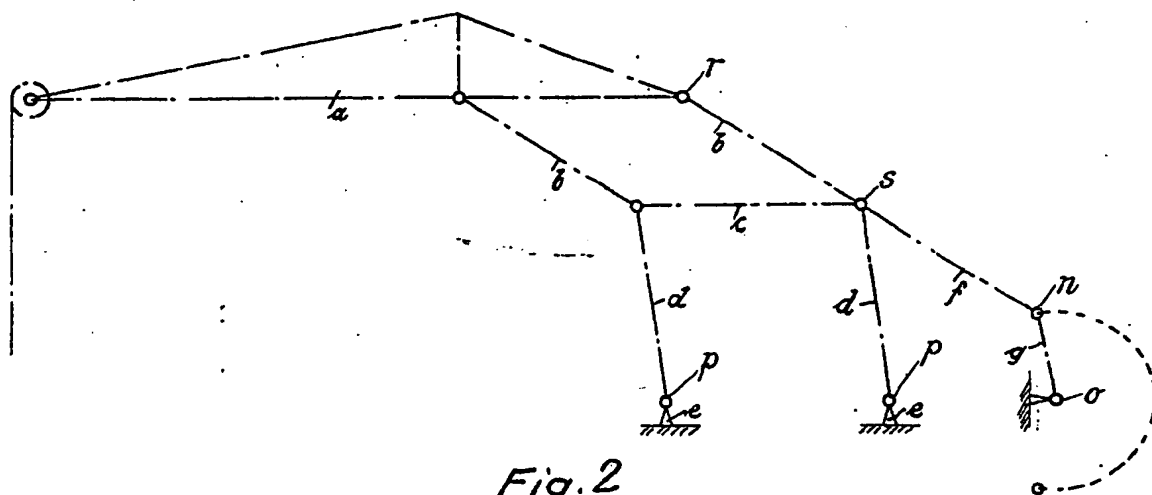
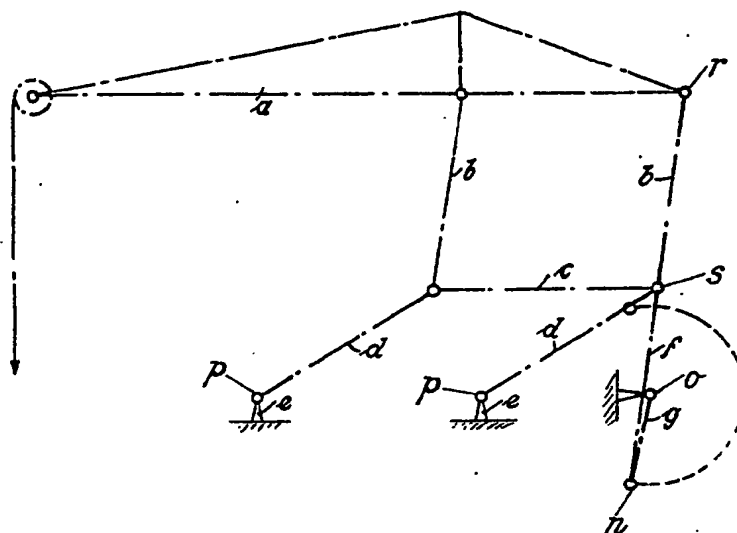


Fig. 2



*[This Drawing is a reproduction of the Original on a reduced scale.]*

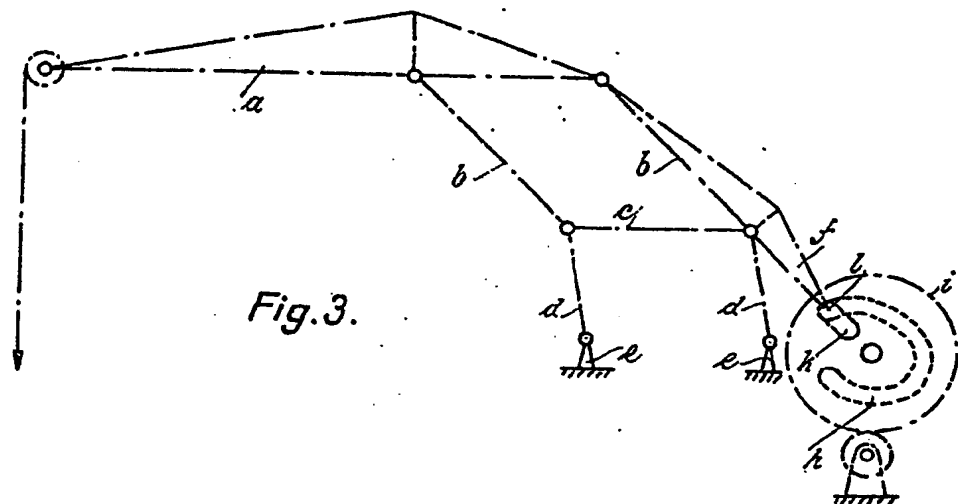


Fig. 3.

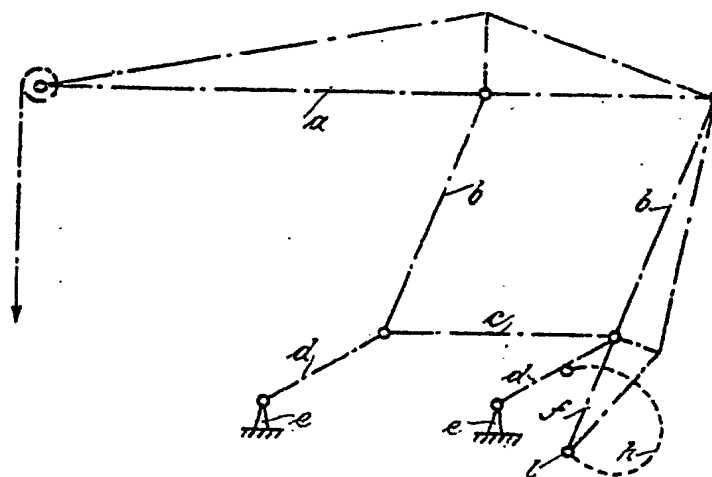


Fig. 4.

Fig.1

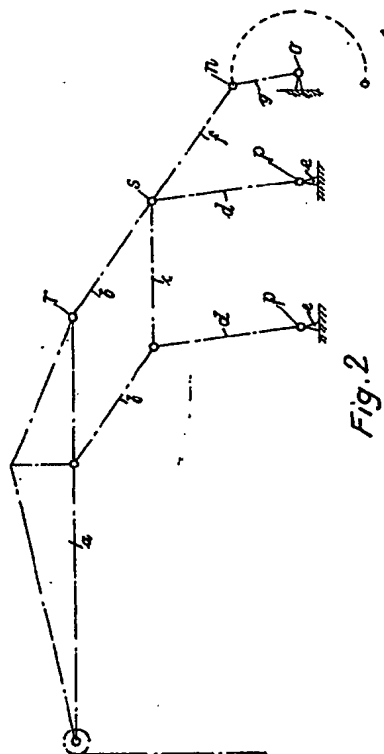


Fig.2

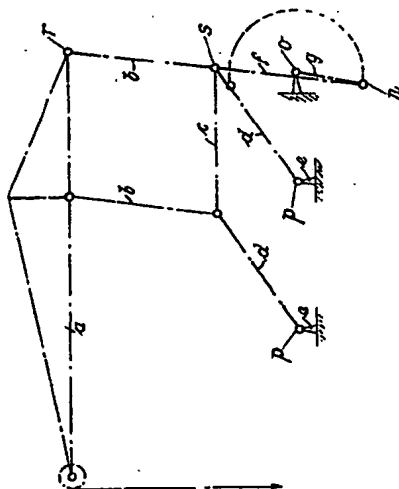


Fig.3.

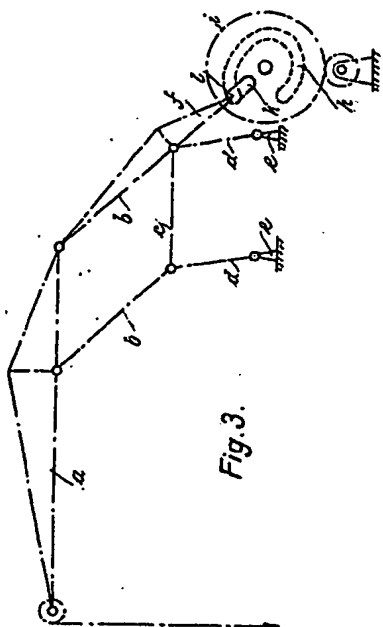
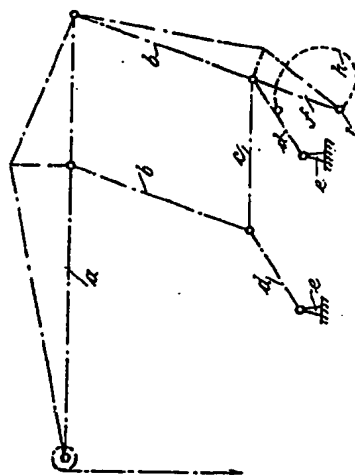
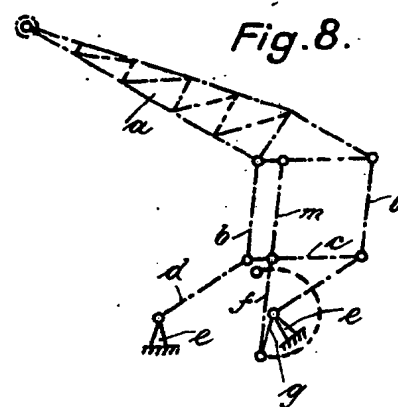
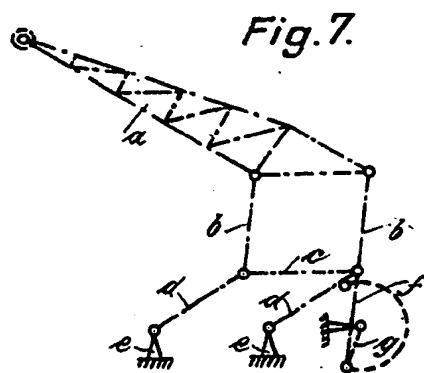
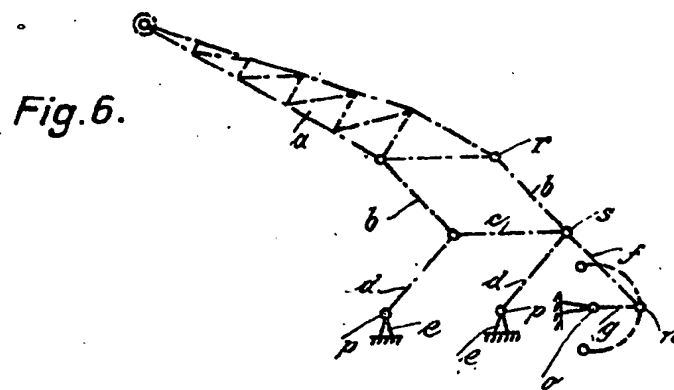
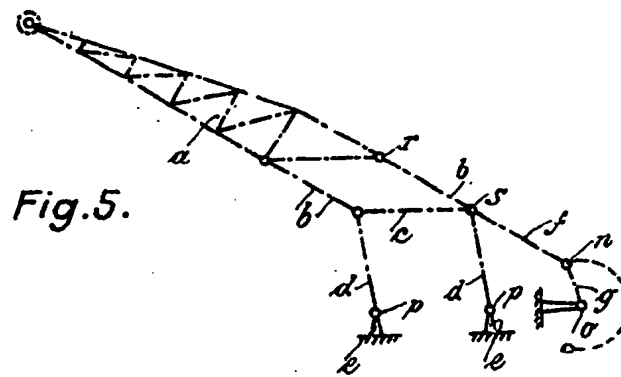


Fig.4.



[This Drawing is a reproduction of the Original on a reduced scale]



Charles &amp; Read Ltd, Photo Litho.

[This Drawing is a reproduction of the Original on a reduced scale.]